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CONTAINER NURSERY OVERVIEW - SIZE, SYSTEMS, AND ENTERPRISE MIX IN U.S.D.A. PLANT HARDINESS ZONE SIX

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INTRODUCTION

To make more informed decisions as to whether to enter, leave, or expand container production, nurserymen require production, marketing and financial information. Changes and competition in the industry make it imperative that nurserymen systematically determine production costs.

Comprehensive cost models have recently been developed for both container and field grown crops in U.S.D.A. Plant Hardiness Zones 5 and 6 (2,3), and for field grown crops in U.S.D.A. Plant Hardiness Zones 7 and 8 (1). This paper presents a small portion of the information to be found in the publication on containers (3). These comprehensive cost models include physical coefficients so that information can be readily updated. Information provided by these studies provide a basis for decision-making for those evaluating the profitability of either establishing a new container nursery, expanding an existing container nursery or phasing out of container production

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OBJECTIVES

The objectives of the study which are reported on in this paper were to:

1. Model production systems that would accomodate a majority of the species of plants being container-grown in U.S.D.A. Plant Hardiness Zone 6.
2. Analyze the important species of plants commonly grown in containers in U.S.D.A. Plant Hardiness Zones 5 and 6, and assign each of them to one of the designated groups based on similarities of growing and production requirements.
3. Design physical facilities including land areas, land improvements, irrigation systems, and buildings for commercial container nurseries based on the model production systems.

MATERIALS AND METHODS

In the study, two model firms were synthesized using the conceptual framework of economic engineering wherein the 'best proven practice' was included in each model. They were synthesized based on the Columbus, Ohio area. The complete synthesis included developing an appropriate production cycle (Tables 1 and 2); schematic drawings of the physical

layout (Figures 1 and 2), including buildings and irrigation system; lists of equipment and other items; a complete sequence by month and year of nursery operational steps beginning with the purchase of plant liners and ending with loading the finished product for wholesale distribution; and budgets for fixed and variable costs (3).

Data for this study were obtained from wholesale nurseries and nursery suppliers in Ohio during 1982. The basic goals in synthesizing the production facilities (see Figures 1 and 2) were to minimize labor expenses, flow and movement of plant material and equipment, water runoff, and initial investment, and to maximize the number of salable plants and allow future expansion.

Assumptions

1. It was assumed that the model nursery would be self sufficient except for liner stock.
2. Purchase of new machinery and equipment was assumed for the model nurseries to achieve "true replacement costs". Many nurserymen may choose to buy used equipment, rent equipment, or time-share some expensive items with other nurseries.

General

Model facilities were synthesized for both a small and large nursery (Figures 1 and 2). The models were designed

for future expansion. Thus, expansion can occur with a minimum of disruption. If growing space were expanded, the central area could be easily expanded without affecting "permanent" facilities.

ENTERPRISE MIX

We assumed that our model nurseries would produce a diverse line of nursery stock, each having a two year production cycle. Commonly grown nursery stock was divided into five cultural groups. While not all inclusive, the groups do permit a range of per unit costs to be developed as they relate to input costs and cultural factors. For analytical purposes, we assumed that each cultural group would occupy 20% of the growing area (i.e. small nursery = 68,000 sq ft per group; large nursery = 176,000 sq ft per group). The small container operation would be comprised of 198,745 plants in full production and the large operation of 399,160 plants. Annual sales capacity for the small operation would be 95,650 plants and for the large operation 192,095 plants. For detailed analysis, one specific plant from each group was chosen as representative of the group. While it is recognized that other plants from each category would have somewhat different requirements, it was felt that

the requirements would not vary significantly in cost from the representative plant. The five groups, with some of their cultural characteristics are listed below:

Group	Plant	Cultural Characteristics
I	SPREADING EVERGREENS	Hardwood bark medium, minimal overwinter structure, 12-15" salable plants.
	Juniperus chinensis (varieties)	
	Juniperus horizontalis (varieties)	
	Thuja occ. woodwardi	
II	SPREADING DECIDUOUS SHRUBS	Hardwood bark medium, maximum overwinter structure, 12-15" salable plants.
	Berberis t. 'Crimson Pygmy'	
	Cotoneaster apiculata	
	Cotoneaster horizontalis	
	Cotoneaster dammerii	
	Euonymus fortunei	

III	SLOW GROWING EVERGREENS	Pinebark medium, minimal overwinter structure, 12-15" salable plants.
	Taxus (species)	
	Buxus (species)	
IV	UPRIGHT DECIDUOUS SHRUBS	Hardwood bark medium, minimal overwinter structure, 18-24" salable plants.
	Euonymus alatus compacta	
	Viburnum (species)	
	Weigela (species)	
	Forsythia (species)	
V	BROADLEAF EVERGREEN	Pinebark medium, maximum overwinter structure, 15-18" salable plants.
	Rhododendron (species)	
	Pieris (species)	
	Pyracantha (species)	

SUMMARY

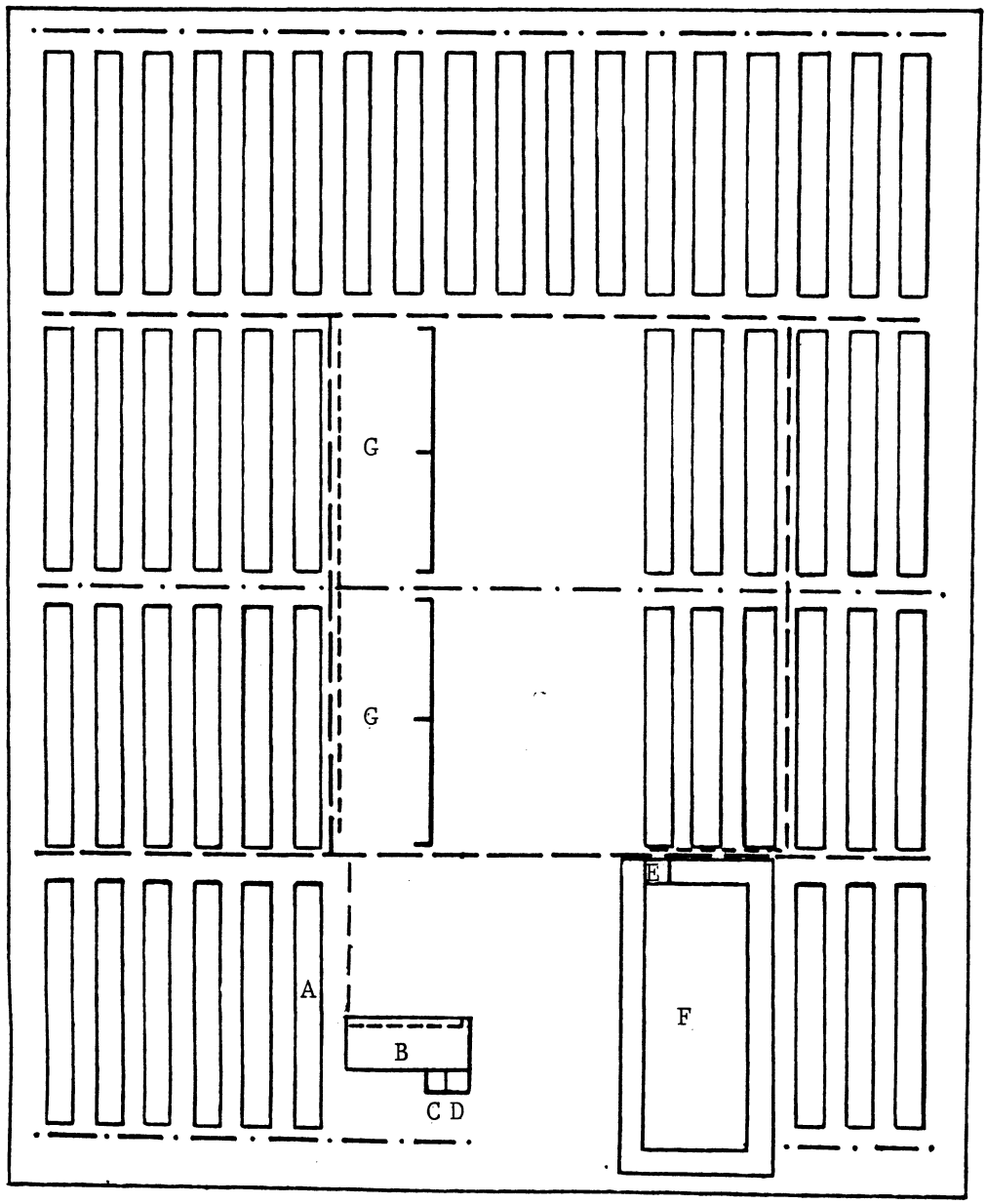
Production schemes for two sizes of nurseries were developed for five categories of container-grown ornamental crops being produced in U.S.D.A. Plant Hardiness Zone 6. These five plant categories would include approximately 90 percent of all container-grown nursery plants being produced in the North Central Region. Based upon these schemes, both a small and large container were synthesized.

LITERATURE CITED

1. Badenhop, M.B., and T.D. Phillips and S-103 Technical Committee. 1985. Costs of Establishing and Operating Field Nurseries Differentiated by Size of Firm and Species of Plant in USDA Climatic Zones 7 and 8. Southern Coop. Ser. Bull. 311.
2. Taylor, Reed D., Harold H. Kneen, Elton M. Smith, David E. Hahn, and Stanley Uchida. 1985. Costs of Establishing and Operating Field Nurseries Differentiated by Size of Firm and Species of Plant in U.S.D.A. Plant Hardiness Zones Five and Six. ESO 1171, Dept. of Agr. Econ. & Rur. Soc., The Ohio State University.

3. Taylor, Reed D., Harold H. Kneen, David E. Hahn, Elton M. Smith and the S-103 Technical Committee. 1983. Costs of Establishing and Operating Container Nurseries Differentiated by Species of Plant in U.S.D.A. Climatic Zone Six. Southern Coop. Ser. Bull. 301.

FIG. 1.--Schematic Drawing of a Small Commercial Container Nursery U.S.D.A. Climatic Zone Six.

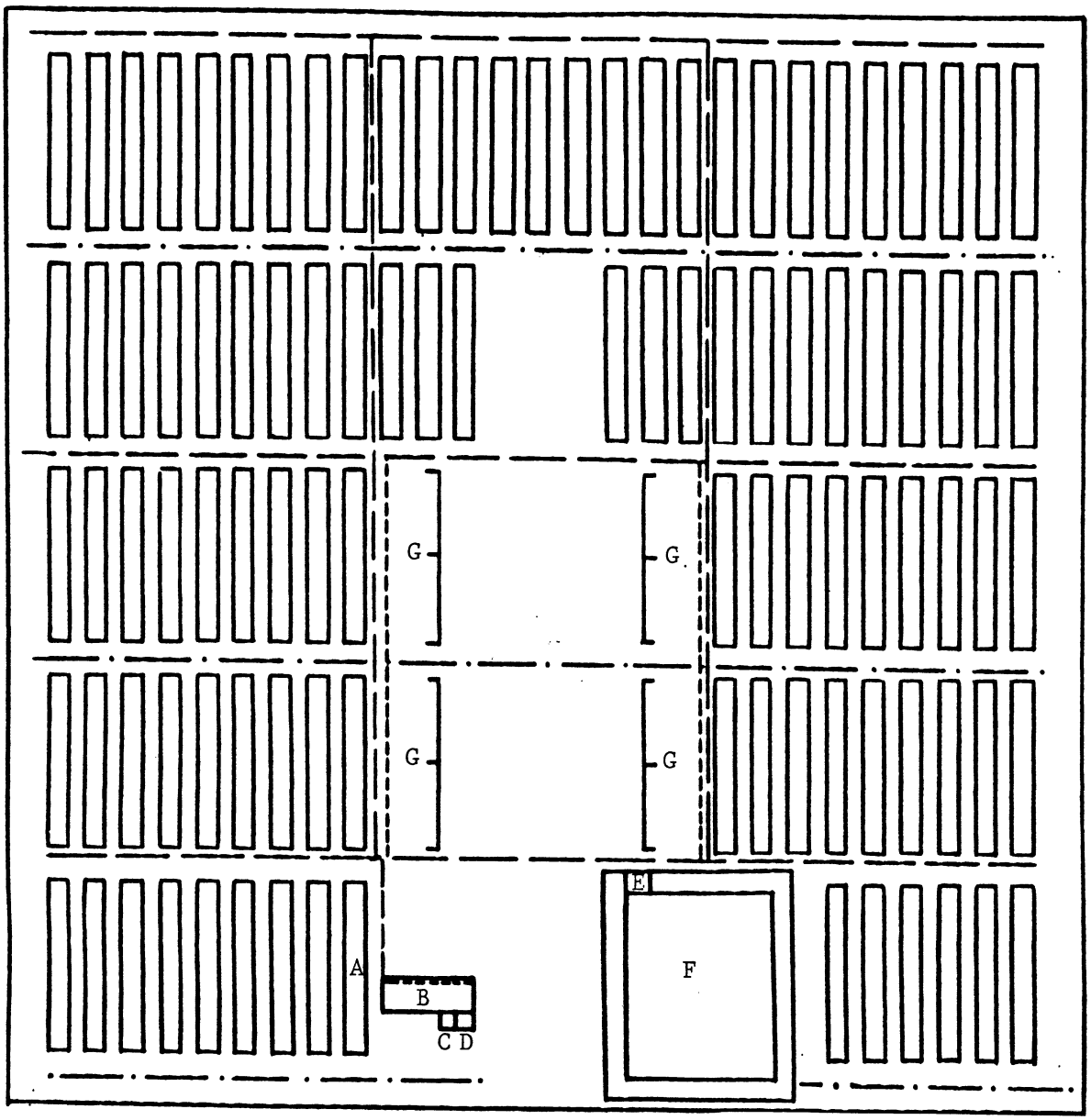


A. Polyhouse structure, 200' x 20'
B. Supply shed, machinery shed, machine shop, 40' x 100'
C. Office, 20' x 20'
D. Restrooms, 20' x 20'
E. Pump house, 10' x 10'
F. Pond, 80' x 120', 14' deep
G. Shipping area, 4 semi truckloads

Drainage Tile, 30" :
Watermain, 8" PVC :
Watermain, 6" PVC :
Watermain, 4" PVC :
Scale : 0 100 200

Total Acreage	= 765' x 970'	= 742,050 sq. ft. = 17.04 acres
Total Polyhouse Acreage	= 51(20' x 200')	= 204,000 sq. ft. = 4.68 acres
Total Growing Space	= 85(20' x 200')	= 340,000 sq. ft. = 7.81 acres

FIG. 2.--Schematic Drawing of a Large Commerical Container Nursery U.S.D.A. Climatic Zone Six.



A. Polyhouse structure, 200' x 20'
B. Supply shed, machinery storage, machinery shop, 40' x 100'
C. Office, 20' x 20'
D. Restrooms, 20' x 20'
E. Pump house, 10' x 10'
F. Pond, 160' x 220', 14' deep
G. Shipping area, 8 semi truckloads

Drainage Tile, 30":
Watermain, 8" PVC :
Watermain, 6" PVC :
Watermain, 4" PVC :
Scale: 0' 100' 200'

Total Acreage - 1230' x 1170' = 1,439,100 = 33.04 acres
Total Polyhouse Acreage - [102(20' x 200')] = 408,000 = 9.37 acres
Total Growing Space - [170(20' x 200')] = 680,000 = 15.61 acres

TABLE 1.--Capacity in Number of Plants and Capital Required per Salable Plant Capacity by Spacing for a Small* Container Nursery in U.S.D.A. Climatic Zone Six, 1982.

Group	Growing Cycle Spacing				Production factors		
	Growing Season On-center (inch)	First Year Over-Wintering (inch)	Second Growing Season On-center (inch)	Second Year Over-Wintering (inch)	Total Plants in Production (units)	Salable Plants per Year (units)	Capital Requirements per Salable Plant Capacity (dollars)
I - Juniperus	9	9	15	12	53,120	25,600	4.63
II - Cotoneaster	12	9	15	15	43,095	20,730	5.72
III - Taxus	9	9	18	15	41,750	20,085	5.90
IV - Viburnum	12	12	21	15	33,655	16,185	7.33
V - Rhododendron	12	12	18	18	27,125	13,050	9.09
Totals					198,745	95,650	6.20

*Total Nursery - 17.04 acres, 340,000 sq ft of growing space, 204,000 sq ft of polyhouse space. Each group of plants would occupy 20 percent of the growing (60,000 sq ft) and polyhouse (40,800 sq ft) space.

TABLE 2.--Capacity in Number of Plants and Capital Required per Salable Plant Capacity by Spacing for a Large* Container Nursery in U.S.D.A. Climatic Zone Six, 1982.

Group	Growing Cycle Spacing				Production factors		
	Growing Season On-center (inch)	First Year Over-Wintering (inch)	Second Growing Season On-center (inch)	Second Year Over-Wintering (inch)	Total Plants in Production (units)	Salable Plants per Year (units)	Capital Requirements per Salable Plant Capacity (dollars)
I - Juniperus	9	9	15	12	107,900	52,000	3.71
II - Cotoneaster	12	9	15	15	86,180	41,455	4.65
III - Taxus	9	9	18	15	83,505	40,165	4.80
IV - Viburnum	12	12	21	15	67,320	32,380	5.96
V - Rhododendron	12	12	18	18	54,255	26,095	7.39
Totals					399,160	192,095	5.02

*Total Nursery - 33.04 acres, 680,000 sq ft of growing space, 408,000 sq ft of polyhouse space. Each group of plants would occupy 20 percent of the growing (136,000 sq ft) and polyhouse (81,600 sq ft) space.